Today's weather forecast for Jupiter is…

Imagine being a student in a middle school classroom in rural Texas, or in downtown Los Angeles, and receiving radio waves directly from Jupiter. That's what students who participate in the Space Operations Management Office's (SOMO) educational project, Goldstone Apple Valley Radio Telescope (GAVRT), are doing. SOMO, which was created in 1995, is a NASA-wide organization managed at JSC under the leadership of Stan C. Newberry. Its primary objective is to provide space operations services for customer missions at lower cost to the agency, emphasizing reliance on commercial service providers.

The GAVRT project is the result of a partnership involving NASA/SOMO, the Jet Propulsion Laboratory in Pasadena, California, and the Lewis Center for Educational Research in Apple Valley, California. Students have access to a 34-meter (112 ft. diameter) radio telescope that until recently was part of NASA's Deep Space Network. The antenna, known as Deep Space Station 12 and located at the Goldstone Deep Space Communications Complex in the Mojave Desert, California, has for the past 30 years communicated with many of JPL's robotic space exploration missions, including Voyagers 1 and 2.

GAVRT is a unique educational project that helps students learn that science is a process and not merely a repetition of memorized facts. The goal of the project is to provide students and educators with curriculum vehicles that will promote science literacy, support a better understanding of the scientific process, and provide the opportunity to collect real-time data with sophisticated science equipment through distance learning.

Using a curriculum module called "Jupiter Quest" which meets national and state science standards, students' studies of the Jovian system culminate in observing sessions where, under the guidance of a GAVRT-trained teacher, they take control of the giant antenna via the Internet. Students learn how to calibrate and point the antenna, then use two different radio frequencies, X-band and S-band, to gather data on the temperature of Jupiter's atmosphere and on the intensity of the radiation belts.

Students work in teams to collect and analyze the data, which is then forwarded to JPL, where it is checked and added to a Jupiter database. Because the high-energy particles in the radiation belts can damage spacecraft components, JPL scientists have been gathering this data for use in planning future space missions. GAVRT students contribute to that growing bank of knowledge.

GAVRT has been operational for three years. A total of 65 teachers have been trained, bringing their knowledge and guidance to 5,200 students in 44 schools in 14 states. The teachers report increased interest in science by their students, and in some cases overall improvement in attitude and accomplishment in other school subjects. Certainly students reap the added benefit of experiencing team involvement and problem solving.

Maintaining the antenna, developing operational software and advising on the accuracy of the science is the responsibility of JPL, while the curriculum preparation, teacher training, and support to the school participants falls to LCER. When a class goes online to access the antenna, the connection is made through the Operations Control Center in Apple Valley and LCER operators are online with the teacher and students to assist with queries regarding either operation or the curriculum.

When the Cassini spacecraft flew by Jupiter last month, selected GAVRT schools took special measurements that will help the Cassini spacecraft perform additional science experiments to enhance the science return when the spacecraft arrives at Saturn and Titan.

GAVRT is bringing a broader understanding of science and the scientific process to many of America's students. One intriguing aspect of the project is the possibility for real discovery—the data students gather is original and the answers are not known beforehand.

This educational project is just the beginning according to Newberry. As NASA migrates toward commercial service providers in satisfying its ground network requirements, SOMO will assess initiatives that will transfer some of NASA's ground communications assets to educational institutions. SOMO is also developing a K-12 teaching curriculum on space and ground communications. ■

For further details on current and upcoming education and outreach activities, please contact Cheevon (Mi-Mi) B. Lau at x36239.

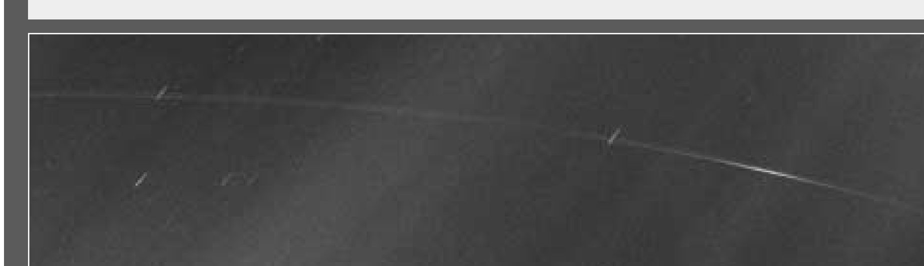
Space Shuttle *Endeavour* and the International Space Station December 9, 2000 flyover

Palm Beach Gardens, Fla. 6:26 p.m. - 6:31 p.m. E.S.T.

Space Shuttle *Endeavour* (STS-97) and the International Space Station pass by the planet Venus (bright object at center right of photo) on December 9, 2000. The clouds are illuminated by a full Moon in the lower left of the photo.

At the time this photo was taken, Canadian astronaut Marc Garneau, aboard *Endeavour*, talked with John Manley, Canadian minister of foreign affairs and international trade; Mac Evans, Canadian Space Agency president; and elementary schoolchildren at the Museum of Science and Technology in Ottawa.

The close-up photo below shows the separation between *Endeavour* (top line) and the ISS (bottom), and a brief brightening of the ISS by several magnitudes.



Whimisical door decor wins decorating contest

Kate Brown and Stacie Bennett kneel by their door. The two won first place in the Avionics System Division door decorating contest for their creative depiction of the Grinch attempting to make off with Cindy-Lou Who's Christmas tree while Max looks on.